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ABSTRACT

Cooperation among students is an instructional technique often cited as a constructive alternative to that used typically, namely intersudent competition. What is missing in the cooperation-competition literature is a clear explanation of why the two techniques should result in differential levels of student motivation. Expectancy theory is used to suggest two cognitive mediating variables (perceived probability of success and value of success) likely to be influenced by altering the cooperation-competition dimension. An instructional approach (TGT) which alters cooperation-competition is described, using expectancy theory as a rationale for predicting differential impacts on student performance. A series of six empirical studies of TGT are reviewed. The overall evidence supports the use of TGT as an instructional device and the relevance of expectancy theory to the cooperation-competition literature. (Author)

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EXPECTANCY THEORY AND COOPERATION-COMPETITION IN THE CLASSROOM[1]

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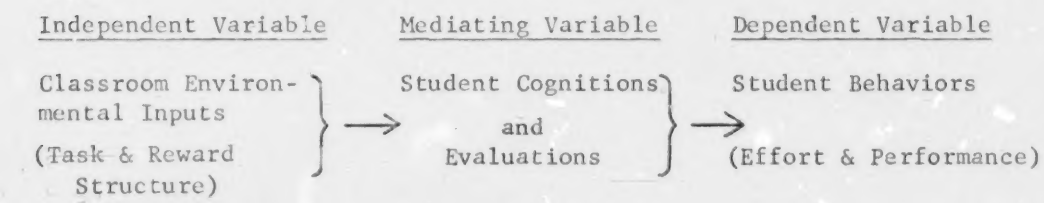
Although cooperation has been cited as a constructive alternative to the competitive goal structure used in most traditional classes (Coleman, 1959; Bronfenbrenner, 1970; Johnson & Johnson, 1974), an explanation of why cooperation is a better alternative is typically lacking. Seldom is it made clear to the reader what cognitive or evaluative mediating factors are changed in the student by cooperative structures. The present paper suggests that expectancy theory, derived from the work of a variety of cognitive psychologists, is a theoretical perspective which explains the differential motivational effects of cooperation-competition treatments by their mediating effects on cognitive processes. The paper summarizes the expectancy theory model, describes a systematic classroom restructuring (TGT) using expectancy theory concepts, reviews the effects of the technique on academic achievement, and outlines the empirical evidence supporting the mediating role of the expectancy theory concepts.

Expectancy Theory

Expectancy theory has appeared in various guises and a variety of subdisciplines within psychology. Various versions of the model have appeared in the literature of verbal conditioning (Dulany, 1967); decision-making (Edwards, 1961; Steiner, 1970), attitude formation (Peak, 1955; Rosenberg, 1956; Fishbein, 1965), and industrial psychology (Vroom, 1964; Galbraith & Cummings, 1967). Recent reviews of expectancy theory and related research can be found in Feather (1966), Mitchell & Biglan (1971), and Kukla (1972). The reviews suggest that expectancy theory refers to a general family of cognitive theories which, despite important differences, share a common perspective on the important concepts required for the analysis of human behavior.

How can expectancy theory be applied to the problem of predicting student academic achievement in a classroom? Figure 1 outlines the common perspective expectancy theorists share when applying their model to student behavior.

Figure 1



Altering characteristics of the classroom learning structure, such as the grading formula, or the nature of the academic tasks performed are predicted to affect student behavior (assessed by both effort and actual performance measures) precisely because they alter the student's beliefs and attitudes about the classroom activities. More specifically, the intensity of effort a student applies to a classroom task (for example, practice sheet or a weekly quiz) is determined by (1) his perceived probability of successfully completing the task, and (2) the value or importance he attaches to such successful competition. Expectancy theorists also contend that the value attached to successfully completing the tasks is, in turn, influenced by the instrumentality of successfully completing the task for attaining other outcomes or rewards (such as peer-group recognition and teacher praise).

As noted in the several reviews of expectancy theory (Feather, 1966; Mitchell & Biglan, 1971; Kukla, 1972), the bulk of the empirical work has focused on predicting human behavior, given knowledge about the individual's expectancy of success and value of success. Although the evidence is mixed,

it appears that an individual's effort is greater the more value he assigns to successfully completing the task. The relationship between effort and perceived probability of success appears to be curvilinear, based on data reported in Atkinson (1958). That is, greatest effort is exerted for tasks for which the individual has an intermediate probability of success. If, for example, the probability of success variable were translated into a probability function, with a range of 00 to 1.00, individuals would exert greater effort at tasks ranging in probabilities of .33 to .67 (the specific boundaries being somewhat arbitrarily defined). It would also be expected that considerably less effort would occur on tasks for which the probability of success were either less than .33 or greater than .67.

As noted by Kukla (1972), the reason for the curvilinear relationship between probability of success and effort is rather simple. Tasks for which the probability of success is high are likely to be defined by individuals as tasks which require little if any effort to succeed. On the other hand, when the task entails a very low probability of success, the individual is likely to assume that great effort will be to no avail. It is only tasks that are viewed as either extremely hard or extremely easy (that is, characterized by moderate probability of success) for which effort can be viewed as a critical determinant of success or failure.

Expectancy Theory: Implications for Classroom Management

The implications of expectancy for the structuring of a classroom learning environment are fairly obvious. Both Kagan (1974) and McKeatchie (1974) have recently analyzed classroom reward and task structures and have suggested reorganizing them using expectancy theory as a guide.

First, with regard to the criteria used for the assignment of grades, it appears that a majority of schools (particularly at the secondary level) use a modified grading on the curve procedure. Pinchak and Breland (1973), in a recently conducted survey of grading practices in secondary schools, report that most schools use a standard A, B, C, and D system in which A = 90% +; B = 80-90%; C = 70-80%; etc. In such schools a teacher is likely to design academic tasks (such as quarterly tests) so that the average student in the class will get approximately 70-80% of the items correct, thus insuring a "C" grade for the average student. By utilizing this one particular criterion for determining success the teacher is likely to give the low achieving students the perception of a low probability of success, whereas the high achieving students will likely perceive themselves as having a remarkably good chance of success. As noted earlier, the empirical research from expectancy theory suggests neither extreme results in high levels of student effort. Expectancy theory suggests a more effective grading formula would be one in which all students in a classroom are exposed to a moderate probability (for example a probability function with a range of .33 to .67) of success at the academic tasks.

A variety of observers of the educational process (Waller, 1932; Coleman, 1959; Bronfenbrenner, 1970) have addressed the issue of the value assigned by students to performing well in the classroom. They have asserted the overriding importance, particularly to adolescents, of social support and approval from their peer groups. At the same time, such observers have noticed the frequent absence of such peer support for academic performance. Support for their assertion has been obtained in several of the authors' recent studies (DeVries, et al., 1971; DeVries & Edwards, 1973; DeVries, et al., 1974b). Students in traditionally conducted secondary level classes

consistently perceived little if any concern by their peers for each others' academic fates. That is, doing well in the classroom was not likely to be rewarded by greater peer approval and, conversely, failing was not likely to result in any particular peer sanctions. It appears that in traditionally structured classrooms success at the academic tasks is not instrumental in obtaining a critical student outcome, namely peer respect and approval. Expectancy theory would suggest that effort and performance on academic tasks can be increased if such effort proves instrumental in obtaining an important outcome such as peer approval.

TGT: A Systematic Application of Expectancy Theory

In attempting to create a classroom instructional routine which maximizes both the probability and value of success by the student in the classroom, the authors formed a technique called Teams-Games-Tournament (TGT). Each of the three TGT components--team competition, instructional games, and tournaments--has been cited by other students of education as important innovations which should strengthen student motivation and effort. The authors have combined the three techniques to create a systemic treatment in which the combination of the three techniques would create an even more positive impact on student effort and performance than would any of the components used in isolation. What follows is a description of each component, as it has been implemented in classrooms, and a rationale, using expectancy theory concepts, for the inclusion of the component.

Teams.

At the beginning of the experimental period students are assigned, on a stratified-random basis, to four or five-member teams (resulting in between 6 and 8 teams per classroom). Each team is representative of the entire class

with respect to academic ability and various individual characteristics such as race and sex. Teammates are assigned adjacent seats in the classroom, and class time is allotted for team meetings, during which peer tutoring and other team-level activities are encouraged. Each team is assigned a performance score (often in the form of a letter or number grade), based on the sum of the performances of the individual teammates on the game tournaments. Team membership is held constant to allow teams to coalesce.

Team grades are assigned on a competitive basis. Based on the scores derived from the game tournament, the teams are ranked, with the top one or two teams being declared the winners. Because the formation of teams is designed to create teams of overall equal ability, each team theoretically has an equal chance of success. Since the number of teams competing in a classroom is relatively small, the chance of any one team succeeding is reasonably high. For example, in a recently conducted TGT experiment, six five-member teams, comprising a thirty-member class, competed in two three-team leagues. Consequently, on any given tournament day, each team theoretically had a probability of .33 of being declared a league champion, and receiving an "A".

In expectancy theory terms the main motivational impact of team competition is due to the increased value students in such treatments place on doing well in the classroom. Coleman (1959), Spilerman (1971), and Bronfenbrenner (1970) have noted that team competition alters the peer group norms such that students (more particularly teammates) positively reinforce each other for successful performance in the classroom. It is also probable that classmates in a team competitive structure will sanction each other and express disapproval for poor performance. In several of

the authors' empirical studies of team competition (DeVries, et al., 1971; DeVries & Edwards, 1973; DeVries, et al., 1974) students in such treatments evidenced greater mutual concern for each other's academic fate, and translated such concern into more active peer tutoring than did students in traditionally structured classrooms. In short, the empirical evidence to date supports the contention that team competition creates an active interest in students in how their classmates are faring academically, thereby resulting in students assigning considerable value to academic success.

Games.

In TGT, students perform frequently (once or twice per week) on a series of learning games designed to assess and reinforce knowledge of classroom-relevant concepts and skills. Both commercially published games and teacher-designed games have been employed in TGT research. The latter games employ a generic gaming structure, entitled GIGS (DeVries, et al., 1973), which was designed by our staff. The games are designed to directly assess student knowledge for specific behavioral objectives included in the curriculum unit. Learning of correct responses to game items is responsive to increased student effort. Consequently, the relationship between student effort and success at the game is fairly direct and positive.

The relevance of the game component to the expectancy theory model lies in the interactive nature of game playing. Learning games typically involve two or more students in a social, or interactive setting in which players must employ academic resources in order to win. It is our belief that involving students in learning games is likely to increase the value they assign to success at academic tasks for the following two reasons: (1) their performance takes place in a public context, one in which success is likely

to be very reinforcing, and (2) the specific nature of the academic tasks encountered by the student tends to be novel, and consequently is frequently free of the aversive qualities of tasks typically employed in the classroom (such as quizzes or worksheets).

Tournament.

Allen, et al., (1970) have proposed a generalized tournament structure which has been adapted to TGT. In the twice weekly tournament sessions, each student is assigned to a tournament table to perform on the learning game in competition against two other students representing other teams. In order to create equitable competition each table consists of students of comparable academic achievement (as defined by prior success or failure at the game). At the end of a tournament session (typically lasting between 30 and 50 minutes) the players at each table compare their scores to determine the top scorer, the middle scorer, and the low scorer. The game scores are converted into points, with a fixed number of points assigned to the top scorer (6 points), middle scorer (4 points), and the low scorer (2 points) at each game table. A player's points are then added to the points his teammates earned to compute a team score. Team scores are then ranked and listed in a tournament newsletter, copies of which are distributed to all members of the class the day following the tournament.

The introduction of the tournament component into the classroom is likely to alter the value the student assigns to success in the classroom. The reduction in number of competitors from thirty to two, both of whom are of comparable ability, drastically increases the objective probability of success for at least a majority of the students in a classroom. For the high achieving students the tournament results in a reduction of

probability of success. The immediate and public nature of the reinforcement (often in the form of classroom newsletters) should heighten the importance assigned to successfully completing the tasks. Both effects should act to make the tournament structure a highly potent classroom structural variation.

To date, TGT has been implemented in self-contained classrooms which have met daily for 45-55 minute sessions. The following schedule has been used: twice weekly tournament (game playing) sessions, with each session preceded by a 20-30 minute team practice session. The remainder of the class time is usually filled with teacher lectures or textbook exercise activities.

In summary, how do the TGT components create a more favorable learning environment, as defined by expectancy theory? A moderate level of probability of success is created for TGT students by the game-tournament and the creation of competition among a small number of equally talented student teams. The value attributed by students to success in the classroom is increased (over that of a traditional classroom) by performing in a public context and by the sharing of academic fates with classmates.

TGT: Effects on Academic Achievement

The authors and their students have, to date, completed six field experimental studies of TGT in classrooms. The research to date has focused on two major questions: (1) Does TGT, when compared with more traditional instructional approaches, result in different levels of cognitive learning outcomes, affective outcomes, as well as classroom learning processes?

(2) What are the relative effects on the abovementioned dependent variables on the several classroom structural variables manipulated by TGT? The six studies have incorporated TGT in a variety of subject areas (mathematics, social studies and language arts) and used a wide range of grade levels (3-12). The studies have ranged in length of implementation from 4 to 12 weeks. With regard to experimental design, three of the experiments randomly assigned individual students to treatment groups. Random assignment of intact classes was employed for the other three studies.

Of particular interest in the current paper is the assessment of the overall effects of TGT on student performance in the classroom. Table 1 summarizes each of the six studies by (1) noting the subject area and grade levels employed and (2) indicating the direction of the effect on both treatment specific and treatment nonspecific measures of academic achievement. The treatment nonspecific measures have been commonly used standardized tests of achievement, such as the SCAT-STEP or the SAT. For all achievement measures a "+" indicates a positive TGT treatment effect at the $P < .05$ level. A "0" indicates no significant effect of TGT. In all cases TGT is being compared with a traditionally structured control class in which students are asked to individually perform the academic tasks and in which the grades are assigned on a competitive basis.

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Insert Table 1
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The table indicates a significant and positive TGT effect on at least one measure of achievement for all six of the studies. In studies (1) and (6) TGT effects were observed on both treatment specific and nonspecific

Table 1

Summary of TGT Effects on Student Performance

Experiment	Subject Area	Grade Level	Achievement Effects: Treatment Specific	Achievement Effects: Treatment Nonspecific
(1) Edwards, et al., (1972)	Math	7	+	+
(2) Edwards & DeVries (1972)	Math	7	+	0
(3) Hulten (1974)	Math	7	--	+
(4) Edwards & DeVries (1974)	Math	7	+	0
	Social Studies	7	0	0
(5) DeVries, Edwards & Wells (1974 a)	Social Studies	10-12	+ ($P < .10$)	0
(6) DeVries & Mescon (1974)	Language Arts	3	+	+

measures of achievement. The effects of TGT on social studies skills [cf. studies (4) and (5)] are considerably less strong. The inability to obtain effects on performance in social studies may be due in part to unclear behavioral objectives in the curriculum units employed which in turn resulted in weak measurement of treatment effects. In general, the results of the six studies do confirm the authors' hypothesis that TGT can have a direct and positive impact on student academic performance.

TGT: Effects on Mediating Cognitions

Although the effects of TGT on achievement support the hypotheses derived earlier from expectancy theory, more direct supportive evidence of the theory is required. Does TGT also affect the student's perception of his probability of success and the value or importance he attaches to success? Two of the abovementioned studies assessed the effects of TGT on the cognitive mediating variables suggested by expectancy theory.

Hulten (1974) measured both components of the expectancy theory model using posttest student questionnaires. For both the "perceived probability of success" and "incentive value of success" scales, TGT classes scored significantly ($P < .01$) higher than the control classes. For both dependent variables the treatment effect was major, accounting for between 8 and 16% of the variance in the dependent variable. Additionally, Hulten found a large positive TGT effect on a measure of peer normative climate. TGT students indicated much greater peer pressure to do well in the classroom. Slavin (1974), who conducted further analyses of the Hulten data, reports further confirming evidence of the greater instrumentality of success in the TGT classes. Slavin found that in traditionally structured classes success at academic tasks was associated with a student having fewer friends.

For the students in TGT classes, however, success at the game appeared to create a wider friendship circle, using sociometric status as the measure. These results confirm the assertion of expectancy theory that increases in value assigned to success in the classroom may be due to such success becoming more instrumental in attaining other outcomes, such as peer respect.

DeVries, et al., (1974) also measured various expectancy theory constructs, although the measures are less direct than those obtained by Hulten (1974). The student's perception of his probability of successfully completing the tasks in his American History class were assessed by an "Efficacy" scale. The scale consisted of items such as "American History is hard for me to understand." The scale measures a general set of beliefs by the student concerning his possibilities of doing well in his American History class. The value or importance of success concept was measured by an "Importance" scale which consisted of such items as "I get disappointed if I do badly on one American History quiz or test." Both scales were administered on a pre- and a posttest basis as part of a larger student questionnaire. For both concepts, significant positive TGT effects (explaining approximately 3% of variance for the dependent variables) were observed. DeVries, et al., (1974b) also assessed the peer normative climate, using a scale similar to that employed by Hulten (1974). As did Hulten, DeVries, et al., found a significant positive TGT effect on peer climate, with students in TGT classes indicating considerably greater mutual interest and concern among students for their fate in the classroom, than did those in traditionally structured classrooms. The observed effect was strong, with the effects of TGT accounting for up to 33% of the variance of the peer normative climate measure.

In short, the evidence indicates expectancy theory provides a useful explanatory schema for the effects on student performance of a classroom technique employing intrateam cooperation and interteam competition (TGT). TGT gives the average student a better chance of success on his day-to-day tasks and results in the student placing greater value on such success. The change in value may be due in part to the increased instrumentality of success on academic tasks for attaining peer recognition and respect.

What is unclear at this point is the nature of the mediating rule (between classroom environmental changes and performance outcomes) of the expectancy theory concepts. The work to date has shown systematic effects of (1) environment (TGT) on student performance and (2) environment on cognitive and evaluative variables suggested by expectancy theory. What remains to be examined is the role of the expectancy concepts in mediating the effect of such classroom environmental variables as those manipulated by TGT on student performance variables. We need to know whether the students in TGT who evidence the greatest growth in academic performance also register the highest level of perceived probability of success and value of success.

Summary

The present paper has examined a particular classroom instructional approach which employs various forms of cooperation and competition (TGT). The potential of TGT for having systematic effects on student performance was explored using expectancy theory concepts. TGT was posited to increase both the perceived probability of success and perceived importance of success for the student. A review of field experiments conducted which examined TGT indicated widespread positive effects on student academic performance. TGT also significantly increased both perceived probability

of success and importance of success in the classroom. These results provide impressive support for TGT as an instructional technique, and for expectancy theory as an effective explanatory device for classroom environmental manipulations involving cooperation-competition.

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